



To: Distribution

From: Mark Goodman PE, Hydraulics Engineer

Date: June 12, 2007

Subject: Alternative Culvert Pipe Material Selection Guidelines

Consultant Design					
Action	Info	Date	Routing	Attach	Initial
	<input checked="" type="checkbox"/>		Bureau Chief		
			Consultant plans Eng		
			Design Supervisor		
			CTEP Engineer		
			<input checked="" type="checkbox"/> All Engineering SMER		
			<input checked="" type="checkbox"/> All Design CONSULTANTS		
			<input checked="" type="checkbox"/> File		

FHWA participated in the development of these guidelines and has concurred with our procedure. The procedure memorandum and concurrence letter between MDT and FHWA are attached for distribution.

These guidelines will become part of the hydraulic design criteria for the development of MDT highway projects. The development of these procedure guidelines does not change our current policy but identifies the need for proper analysis and requires documentation of the material selection. Therefore, it will be important to adequately document the material selection process in all future preliminary and final hydraulic reports.

034:MAG:djh
Attachments

Distribution
w/ Attach:

- Loran Frazier - Engineering
- Jim Walther - Engineering
- Paul Ferry – Highways
- Damian Krings – Highways
- Lesly Tribelhorn – Highways
- ✓ Tom Martin – Consultant Design
- Dwane Kailey – Missoula District
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- Mick Johnson – Great Falls District
- Ray Mengel – Glendive District
- Bruce Barrett – Billings District
- Matt Strizich – Materials
- Rich Jackson – Geotechnical
- Kevin Christensen – Construction
- Mark Goodman – Hydraulics
- Kurt Marcoux – Hydraulics
- Dave Leitheiser – Hydraulics
- Walt Ludlow – Hydraulics
- Jerry Michel – Hydraulics
- KC Yahvah – Hydraulics
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- Russ Brewer - Hydraulics
- Mark Wotring – Hydraulics
- JR Taylor - Hydraulics
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April 25, 2007

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Subject: 23 CFR 635.411
Alternate Pipe Material Selection

With the December 15, 2006 revision to CFR 645.411 concerning alternate culvert pipe material selection, MDT has decided to clarify with FHWA our procedure with regard to this subject. Attached is a procedure memorandum entitled Pipe Material Selection Guidelines, dated April 24, 2007.

The Memorandum does not constitute a change to our current policy but emphasizes the need for proper analysis and documentation of material selection. This will continue to encourage competitive bidding while resulting in well engineered cost-effective installations.

Two copies of the memorandum are attached for your concurrence. Please return one copy and keep the other for your files. We appreciate your assistance in developing these guidelines and please feel free to contact me if you have any questions or comments.

Sincerely

James Walther, PE
Preconstruction Engineer

FHWA Concurrence: Theodore J. Burch Date: 06/06/2007

Attachment
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PROCEDURE MEMORANDUM PIPE MATERIAL SELECTION GUIDELINES

General

Effective December 15, 2006 the final rule on pipe selection was published. This rule amends the material selection policies to support competitive bidding. Rule 23 CFR 635.411 (b) requires that all available non-proprietary pipe products that are judged to be of satisfactory quality and equally acceptable on the basis of engineering properties and economic analysis be considered. When products appear to be equal, alternative or optional bidding practices are required.

The rule further states that, where alternative products are determined to have different engineering and economic properties, based on the required engineering properties and/or life cycle cost criteria the State DOT should document its material selection decision on a project or program basis as appropriate. This document does not constitute a change to our current guidelines but emphasizes the need for proper analysis and documentation of material selection. This will continue to encourage competitive bidding while resulting in well engineered cost-effective installations.

It is MDT's practice to specify alternate or optional pipe materials where they can be used. To qualify for selection, optional pipe materials must meet the following criteria:

- Provide adequate hydraulic capacity
- Withstand forces of the weight of the fill over the pipe.
- Withstand forces of traffic loads and construction equipment during pipe installation and under post construction conditions.
- Withstand hydrostatic pressure to prevent fluid from leaking out of the pipe into the surrounding bed materials.
- Provide adequate service life in relation to the Culvert Service Life Guidelines.
- Withstand corrosion caused by the fluids conveyed by the pipe and the soil surrounding the pipe.
- Withstand abrasion from solids carried by the flow.
- Withstand fire and combustion.
- Be constructible within the constraints of the site.
- Provide desired fish passage characteristics and meet other project based environmental requirements.
- Consider local government preferences
- Fulfill the need for experimental installations and/or Materials Bureau product review process.

Culverts, storm drains, or other installations shall be studied on a case by case basis to determine if the optional materials satisfy these requirements.

Pipe Materials

Currently the Department is utilizing the following pipe materials as appropriate for mainline culvert crossings, approach culverts, irrigation facilities, and storm drains. For guidelines on the selection and use of optional pipe materials for specific applications see Table 2. The list of factors to be considered is not intended to be all inclusive, therefore a proper engineering analysis is required for all installations. For large installations, the analysis should include installation cost comparisons.

Table 1 – Pipe Materials

<u>Material</u>	<u>Abbreviation</u>	<u>AASHTO Specification</u>	<u>MDT Specification</u>
Corrugated Steel Pipe*	CSP	AASHTO M 36	709.02
Corrugated Steel Pipe Arch*	CSPA	AASHTO M 36	709.02
Structural Steel Plate Pipe**	SSPP	AASHTO M 167	709.03
Structural Steel Plate Pipe Arch**	SSPPA	AASHTO M 167	709.03
Reinforced Concrete Pipe	RCP	AASHTO M 170	708.01.2
Reinforced Concrete Pipe Arch	RCPA	AASHTO M 206	708.01.3
Reinforced Concrete Box	RCB	AASHTO M 259 AASHTO M 273	-
Corrugated Aluminum Pipe	CAP	AASHTO M 196	709.07
Corrugated Polyethylene Pipe	HDPE	AASHTO M 294	708.07
* Acceptable coatings :	- Type II Aluminized	AASHTO M 274	709.12
	- Pre-Coated Polymeric	AASHTO M 245	709.05
	- Bituminous	AASHTO M 243	709.04
** Acceptable coatings:	- Bituminous	AASHTO M 243	709.04

New Materials

Pipe materials that the Department does not have a history with in drainage applications are generally not listed on Tables 1 and 2. However, the Department is willing to review new products to determine if the product could be suitable for highway use in the future.

Specifications for new pipe materials may be submitted to the Department's Standards Committee for review. The Standards Committee is administered by the Materials Bureau. Experts from various sections within the Department including Construction, Maintenance, Geotechnical, Hydraulics, Bridge, and Road Design may be asked to participate in product reviews.

Submitted products are reviewed for specification requirements, product history, previous usages, constructability, and tested in the Department's materials laboratory. If a product or material is found to be acceptable it may be utilized on specific projects on an experimental basis. Currently the Department has an experimental project involving polyethylene pipe.

Public Interest Finding

Pursuant to 23 CFR 635.411, a letter of public interest finding is required for;

- Proprietary materials
- Single material selections (those without options) not shown Table 2

MDT will prepare all public interest findings and will retain approval authority for projects that are defined as non-full oversight in the most current FHWA/MDT/MTC Partnership Agreement.

FHWA will be included in the distribution for concurrence and recommendations on all public interest findings. FHWA will retain public interest finding approval authority for full oversight projects. The current definition for full oversight projects are those on the National Highway System that meet the following criteria:

- All projects on the non-Interstate NHS costing \$3 million or more.
- All reconstruction projects on the Interstate system costing \$1 million or more.
- Pavement preservation and rehabilitations projects on the Interstate system costing \$3 million or more.

The purpose of the public interest finding is to clearly document the reasoning and justification for the selection (i.e. synchronization).

Plan Preparation

MDT will continue to utilize the "Optional Pipe Culvert Summary Frame" as included in the Road Design Manual per Fig 4.4 K-7 in order to specify proposed materials for reconstruction projects. When pipe extensions are required, the culvert summary frame shown in Fig 4.4 K-8 may be used.

Alternate culvert summary frames as shown in Fig 4.4 K-9 may be used when large diameter structures such as reinforced concrete boxes or structural steel pipes are to be considered as alternate bid items or when a specific material may require special treatment but should be included in the overall cost of the installation. Use of this frame should be discussed and agreed to at PIH.